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10/501,333	07/23/2004	Naoto Ohta	256241US0PCT	9835

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EXAMINER	
BEST, ZACHARY P	

ART UNIT	PAPER NUMBER
4191	

NOTIFICATION DATE	DELIVERY MODE
04/25/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/501,333	OHTA ET AL.	
	Examiner	Art Unit	
	Zachary Best	4191	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 March 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,5 and 8-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,5,8-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

NEGATIVE ELECTRODE MATERIAL FOR LITHIUM ION SECONDARY BATTERY

Examiner: Z. Best S.N. 10/501,333 Art Unit: 4191 April 21, 2008

Detailed Action

1. Applicant's amendment filed on March 26, 2008 was received. The specification and drawings were amended. Claims 1, 8, and 12 were amended. Claims 2-4 and 6-7 were cancelled. Claims 13-20 were newly added.

2. The text of sections of U.S.C. Title 35 not included in this action can be found in the prior Office Action issued December 27, 2007.

Drawings

3. The objection on the drawings is withdrawn because Figure 1 has been amended.

Specification

4. The objection to the specification is withdrawn because the abstract and specification have been amended.

Claim Objections

5. The objection to Claims 3 and 7 are withdrawn because said claims have been cancelled. The portions of Claims 1 and 13 that comprise the similar portions are accepted in regards to the objections of Claims 3 and 7.

Claim Rejections - 35 USC § 112

6. The rejections of Claims 8-10 are withdrawn because Claim 1 was amended to identify the graphite powder.

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claims 13-20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. A graphite powder may be different from another, for use as an anode material, in terms of chemistry (purity), shape (e.g., flake, oval, spherical), and density, and the broad scope of such claim was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

Claim Rejections - 35 USC § 102 / 103

9. Claims 1, 5, and 8-12 are rejected under 35 U.S.C. 102(e) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Yoon et al. (U.S. Patent No. 6,596,437 B2).

Regarding Claims 1, 5, and 8-10, Yoon et al. teach an anode material for a lithium ion secondary battery comprising a coated graphite powder coated with a carbonized material of thermoplastic resin as a raw material (see claim 1) with an average particle size between 10-50 μm (see col. 5, lines 22-23), wherein the peak strength ratio (I_{360}/ I_{580}) is 0.4 or less (see col. 5, lines 39-42). It is the Examiner's position that the other properties of the anode material of Yoon et al., such as the mesopore volume, standard deviation of particle size, rate of oxidation loss, specific surface area, H/C value, L(112) spacing, accumulative pore volume difference, and change in mesopore volume due to coating, are inherent, given that the anode material of Yoon et al. and the present application have similar process steps, the peak strength ratios (I_{360}/ I_{580}), interlayer spacings d_{002}, and precursor materials. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. Inherency is not established by probabilities or possibilities. *In re Robertson*, 49 USPQ2d 1949 (1999).

Alternatively, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the mesopore volume, cumulative pore volume difference, and change in mesopore volume due to coating to by changing the thickness of

the coating in order to resist a lowered battery capacity due to electrolyte penetration (see Yoon et al., col. 5, lines 43-56).

Regarding Claim 8, Yoon et al. teach the interlayer spacing d_{002} of the core graphite between 0.335-0.342 nm (see col. 5, lines 37-40).

Regarding Claim 11, Yoon et al. teach the coated graphite powder is coated with carbonized material of thermoplastic resin of a carbonization yield of 10-20% (see Example 1 and Example 3), and Yoon et al. teach the ratio of thermoplastic to graphite powder (see Example 1 and Example 3).

Regarding Claim 12, Yoon et al. teach the thermoplastic resin may be polyvinyl alcohol (see claim 4).

10. Claims 13-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoon et al (U.S. Patent No. 6,596,437 B2) in view of Aihara et al. (JP 2001-196097).

Regarding Claims 13-18, Yoon et al. teach an anode material for a lithium ion secondary battery comprising a coated graphite powder coated with a carbonized material of thermoplastic resin as a raw material (see claim 1) with an average particle size between 10-50 μm (see col. 5, lines 22-23), wherein the peak strength ratio (I_{360}/ I_{580}) is 0.4 or less (see col. 5, lines 39-42). It is the Examiner's position that the other properties of the anode material of Yoon et al., such as the mesopore volume, standard deviation of particle size, rate of oxidation loss, specific surface area, H/C value, L(112) spacing, accumulative pore volume difference, and change in mesopore volume due to coating, are inherent, given that

the anode material of Yoon et al. and the present application have similar process steps, the peak strength ratios (I_{360}/ I_{580}), interlayer spacings d_{002}, and precursor materials. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. Inherency is not established by probabilities or possibilities. *In re Robertson*, 49 USPQ2d 1949 (1999). However, Yoon et al. fail to disclose a coated graphite powder as a mixture of two different kind of coated graphite powders in average particle size from each other.

Aihara et al. teach an anode material for a lithium ion secondary battery comprising graphite powder (section 0122) where the graphite powder is a mixture of two different kinds of graphite powders different in average particle size from each other (section 0123). Aihara et al. further teach that the ratio of average particle sizes is 0.3 (section 0123). Therefore, one graphite powder having an average particle size of 25 μm will be mixed with another graphite powder having an average particle size of approximately 8 μm (7.5 μm). The mixture of two different kinds of graphite powders as taught by Aihara et al. would be advantageous because of increased discharge capacity and discharge cycle properties (section 0028). Alternatively, it would have been obvious to one having ordinary skill in the art at the time the invention was made to adjust the filling factor of the two different kinds of graphite powders by changing average particle size of the two different kinds of graphite powder because Aihara et al. teach the discharge capacity per unit volume can be varied depending on the filling factor of the anode material. (sections 0109-0111, see also drawing 41). Discovery of an optimum value of a result effective variable involves only routine skill in the

art. *In re Boesch*, 617 F.2d 272 (CCPA 1980). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make an anode material for a lithium ion secondary battery of Yoon et al. with the mixture of two different kinds of graphite powders different in average particle size from each other because Aihara et al teach resultant increase in discharge capacity and discharge cycle properties due to variation of the filling factor.

Regarding Claim 19, Yoon et al. teach the coated graphite powder is coated with carbonized material of thermoplastic resin of a carbonization yield of 10-20% (see Example 1 and Example 3), and Yoon et al. teach the ratio of thermoplastic to graphite powder (see Example 1 and Example 3).

Regarding Claim 20, Yoon et al. teach the thermoplastic resin may be polyvinyl alcohol (see claim 4).

Response to Amendment

11. Applicant's arguments filed on March 26, 2008 have been fully considered, but they are not persuasive.

Applicant argues:

(a) Yoon et al. do not teach control over specific surface area;

(b) Aihara et al. do not teach or anticipate a similar range in values for the particle size ratio;

(c) A person having ordinary skill in the art would not combine Yoon et al. with Aihara et al. because it could increase the irreversibility capacity of the battery.

In response to Applicant's arguments:

(a) Yoon et al. teach two distinct methods of controlling specific surface area. First, Yoon et al. teach the importance of the average particle size being in the preferred range (col. 5, lines 18-34). Increasing or decreasing the average particle size will inherently correlate with an increase or decrease in the specific surface area. Furthermore, Yoon et al. specifically note the effect the particle size, and therefore specific surface area, has on high rate characteristics of the active material (col. 5, lines 24 -34). Second, Yoon et al. teach the importance of the thickness of the coating being in the preferred range (col. 5, lines 43-55). Increasing or decreasing the thickness of the coating will inherently correlate with an increase or decrease in the specific surface area. Furthermore, Yoon et al. specifically note the effect the thickness of the coating, and therefore specific surface area, has on voltage

flatness and battery capacity (col. 5, lines 47-55). Therefore, Yoon et al. does specifically teach the control of specific surface area.

As Applicant admits, Yoon et al. teach similar parameters to the creation of the anode material. Both Yoon et al. and Applicant use a crystalline carbon (graphite) powder (Yoon et al., col. 5, lines 18-23) having the same average particle size (Yoon et al., col. 5, line 23), d_{002} spacing (Yoon et al., col. 5, line 40), and peak strength ratio of 1360 cm^{-1} to 1580 cm^{-1} (Yoon et al., col. 5, line 42). Both Yoon et al. and Applicant use the same or similar coating precursors, specifically polyvinyl alcohol (Yoon et al., claim 4) and the same anode material binders, specifically polyvinylidene fluoride (Yoon et al., col. 6, lines 47-48). Both Yoon et al. and Applicant heat treat (bakes) the precursor materials at the same or similar temperatures (Yoon et al., col. 4, lines 9-13). Therefore, the measured properties of the anode material of Yoon et al., such as the mesopore volume, rate of oxidation loss, specific surface area, H/C value, L(112) spacing, accumulative pore volume difference, and change in mesopore volume due to coating would be inherent, and anticipate or be obvious to Applicant's claimed invention.

(b) Aihara et al. specifically teach the preferred ratio of sizes is 0.3 to 1 for the two different graphite powders that are different in average particle size from one another (section 0111). Therefore, one graphite powder having an average particle size of 25 μm will be mixed with another graphite powder having an average particle size of approximately 8 μm (7.5 μm). However, Aihara et al. also teach that the filling factor of the anode material is a result effective variable that affects the discharge capacity per unit volume of the anode

material (section 0111). Given the anticipated range of Yoon et al. for the average particle size (Yoon et al., col. 5, line 23), it would have been routine for one having ordinary skill in the art to discover the optimum value of the different particle sizes of the two different graphite powders.

(c) Applicant claims that the mixture of graphite powders disclosed in Aihara et al. could result in the decomposition of the electrolytic solution, which would increase the irreversibility capacity of the battery. Applicant has provided no basis for this belief, and so it is treated as mere opinion. To the contrary, Aihara et al. specifically teach that improving the filling factor will increase the discharge capacity per unit of volume of anode material (section 0111). Even if the increase in the discharge capacity per unit of volume of anode material resulted in some decomposition of the electrolytic material, a person having ordinary skill in the art could find it beneficial to increase the discharge capacity per unit of volume in exchange for a concurrent reduction in irreversibility capacity. Therefore, a person having ordinary skill in the art would have found it advantageous to use the teachings of Aihara et al. applied to the coated graphite powder of Yoon et al. because it would increase the discharge capacity per unit of volume in the anode material.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zachary Best whose telephone number is (571) 270-3963. The examiner can normally be reached on Monday to Thursday, 7:30 - 5:00 (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on (571) 272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service

Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

zpb

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 4191